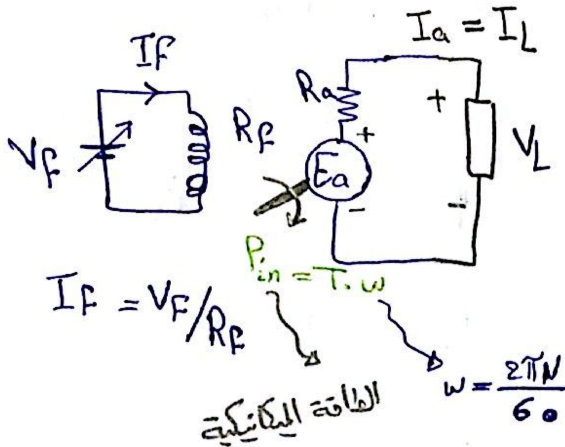
amr elbrol

3/3/2016 — آلات كهربية — محاضرة 2 — 9

# 1-12- Methods of Exaitation
طرق التغذية

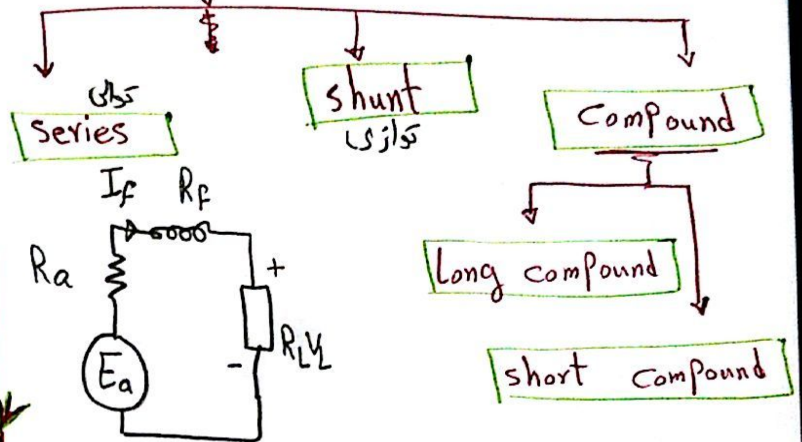
- separatly excited D.c enerator
- self exceited D.c Generator.




$I_f = V_f / R_f$

الطاقة الميكانيكية

$\omega = \frac{2\pi N}{60}$




$$V_L = E_a - I_a R_a - \Delta V_b$$

$\Delta V_b$: مقدار فرق الجهد المفقود على الريش .

$$P_{out} = P_L = V_L * I_L = I_L^2 * R_L.$$

$$P_a = E_a * I_a$$

$$P_{R_a} = I_a^2 * R_a \rightarrow \text{(Losses)}$$

$$E_a = V_L + I_a R_a + I_f R_f + \Delta V_b.$$

$$E_a = V_L + I_a [R_a + R_s] + \Delta V_b.$$

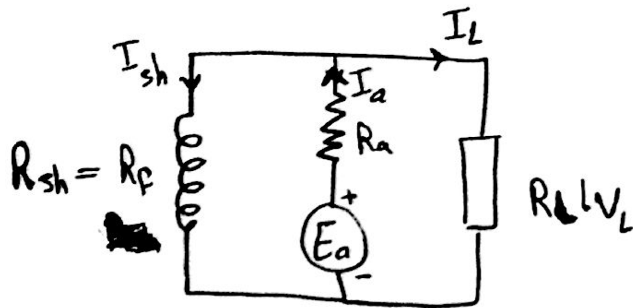
$$P_a = E_a I_a.$$

$$P_L = V_L I_L.$$

$$\left.\begin{array}{l} P_{R_a} = I_a^2 \cdot R_a \\ P_{R_s} = I_a^2 R_s \end{array}\right\} \rightarrow \text{Losses.}$$

b

2 shunt




$$I_a = I_L + I_{sh}$$

$$I_{sh} = \frac{V_L}{R_{sh}}$$

$$E_a = V_L + I_a R_a + \Delta V_b .$$

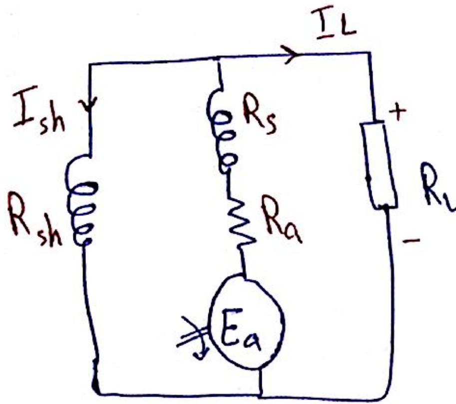
$$P_a = E_a I_a$$

losess ←
$$P_{R_a} = I_a^2 \cdot R_a$$
$$P_{R_{sh}} = I_{sh}^2 \cdot R_{sh} .$$

$$P_L = V_L I_L = I_L^2 \cdot R_L = V_L^2 / R_L$$

# Compound

Long | Short




$I_a = I_L + I_{sh}$

$I_a = I_s$

$V_L = I_L * R_L$

$E_a = V_L + I_a(R_a + R_s) + \Delta V_b$

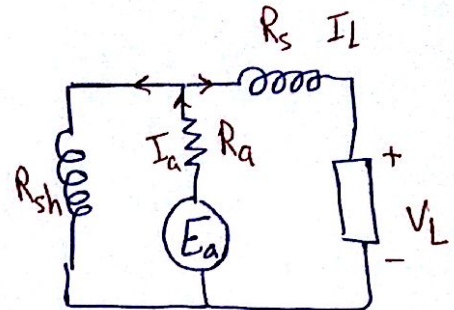
$I_{sh} = \frac{V}{R_{sh}}$

$P_a = E_a I_a$

$P_{Ra} = I_a^2 * R_a$

$P_{Rs} = I_s^2 * R_s$

$R_{sh} = I_{sh}^2 * R_{sh}$




$I_a = I_{sh} + I_L$

$E_a = V_L + I_a R_a + I_L R_s + \Delta V_b$.

$I_{sh} = \frac{V_L + R_s I_L}{R_{sh}} = \frac{-I_a R_a - \Delta V_b + E_a}{R_{sh}}$

$P_a = E_a I_a$

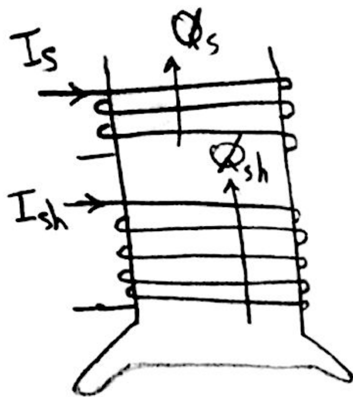
$P_{Ra} = I_a^2 * R_a$

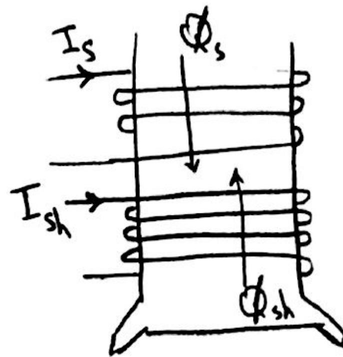
$P_{Rs} = I_L^2 * R_s$

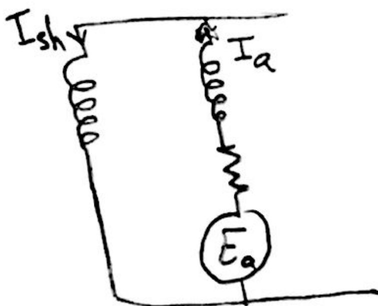
$P_{R_{sh}} = I_{sh}^2 * R_{sh}$

تراكمي

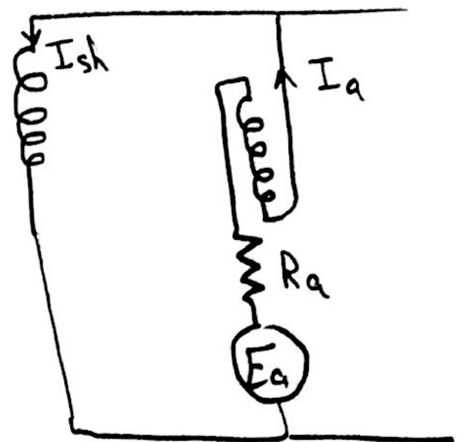
# Cumulative and differnatial compound Generator.



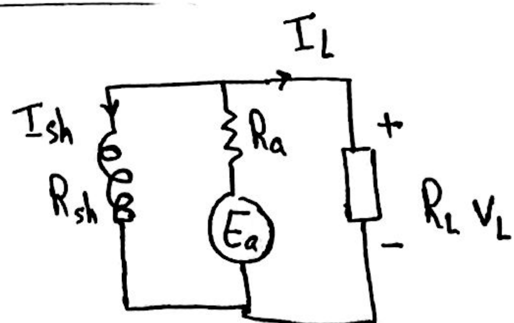




$$\phi_t = \phi_{sh} + \phi_s$$




$$\phi_t = \phi_{sh} - \phi_s$$

## Example D.C. shunt G.n




**Given**

$R_{sh} = 100\ \Omega$

$P_L = 5$ Kw

$V_L = 250$

$R_a = 0.22\ \Omega$

Find → $E_a = ?!$

**solution**

$E_a = V_L + I_a R_a$ (250, ??, 0.22)

$P_L = V_L I_L$ $\quad I_L = \frac{5000}{250} = 20$ A

$I_{sh} = V_L / R_{sh} = \frac{250}{100} = 2.5$ A

$I_a = I_L + I_{sh} = 22.5$ A

$E_a = 250 + 22.5 * 0.22$

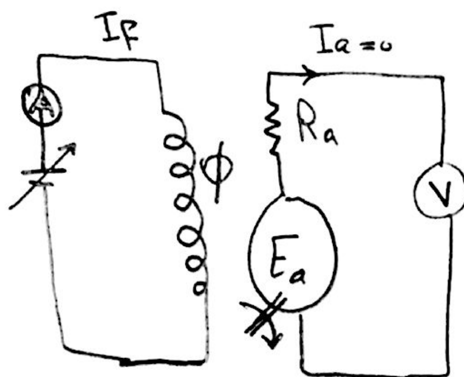
$= 254.95$ volt

خواص

## 1-18 characteristics of D.c Generator

a) Magnetization characteristics [No load ch/s]

b) load characteristics → internal. → External.




$E_a \longrightarrow I_f\ (\phi)$

$$E = \frac{P}{A}\phi\frac{ZN}{60}$$

$$E = k\phi N$$

$$\phi \propto I_f$$

| If | 1 | 2 | 3 | 4 | 5 | 7 | 10 |
|---|---|---|---|---|---|---|---|
| E | 20 | 40 | 70 | 90 | 95 | 115 | 130 |

